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FINAL REPORT FOR
CHEMETCO, INC.
APRIL 12, 1987

CHEMETCO, INC.
HARTFORD, ILLINOIS
FOS-8'03-418

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11985/0003 - Madison, Wis.
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Chicago, Illinois

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INTRODUCTION

Chemetco, Inc. (Chemetco) operates a secondary copper smelter in Hartford, Illinois (SE1/4, Sec. 16, T. 4N., R. 3E., Madison County). Hartford is located north of Alton, Illinois, near St. Louis, Missouri. Chemetco is a major producer of high purity copper, lead, tin, nickel, and their alloys derived from recycling. The operation is regulated by the Resource Conservation and Recovery Act (RCRA) as a treatment and storage facility for hazardous waste. A vicinity map is shown in Figure 1 and Figure 2 provides a map of the facility.

SITE HISTORY

The company was incorporated June 9, 1969, as Chemetco Metals Corp. and began copper production in March 1972. In 1973, the corporation changed its name to Chemetco, Inc.

Chemetco was recognized as a potential dioxin site in early 1987 following two dioxin studies of IBS, Inc., of Peoria, Illinois by a U.S. Environmental Protection Agency (U.S. EPA) Tier Four dioxin study. IBS was a metal salvage facility that reclaimed metals primarily from automobiles but had also processed junk wire and transformers from Illinois power plants. Their refining process involved simple incineration, in which metals were recovered by burning off all combustibles. Incinerator ash at IBS was found to contain 20 ppb tetrachlorodibenzo-p-dioxin (2378 TCDD) by the initial U.S. EPA study. A later U.S. EPA study revealed up to 9.5 ppm 2378-TCDD in site soils at IBS.

Acting on those results, U.S. EPA tracked the movement of materials out of IBS and discovered that copper scrap and incinerator ash were periodically shipped to Chemetco. According to IBS, some, but not all of these shipments included packages of incinerator ash. The quantity of incinerator ash shipped from IBS to Chemetco cannot be determined. The U.S. EPA then tasked Ecology and Environment, Inc., Field Investigation Team (FIT) to design and perform a dioxin study at Chemetco.

PROCESS

Chemetco's smelting process utilizes copper materials from a variety of sources, including electrical and electronic equipment, skimmings, slags, turnings, grindings, and other residues from foundries and factories, auto parts and building components.

Figure 3 illustrates the Chemetco smelting process in a simplified manner. Copper-bearing raw materials are sent through two smelting furnaces, the second being a higher temperature furnace. The resulting product is 99% pure copper. This copper is then molded into anodes and transferred to an electrolytic bath where electrolysis forms the 99.98% pure copper cathodes. Also illustrated on the diagram are points where products are discharged from the system. Currently, the process ends after the second furnace stage, in which 99% pure copper is the final product.

If dioxin were present in the IBS product refined by Chemetco and if traced through the smelting process (Figure 3), it may have been vaporized and carried with flue gases from smelting furnace #2 to the wet scrubber, and then discharged with flue gases from the wet scrubber.

OBJECTIVE

The objective of F/T work at Chemetco was to determine the presence or absence of dioxin.

Soil sampling was performed on April 12, 1987. Five samples were chosen to encompass a variety of outlets of the smelting process. (Sample locations are identified in Figure 2). Samples included smelting waste (refining slag), cooling water (sampled indirectly from cooling water canal sediment), and scrubber wastes (polish pit sediment and zinc oxide). A composite sample was also taken of sediment on the unloading (staging) area for stored incoming wastes.

Sample collection procedures are given in Appendix A and sampling equipment is listed in Appendix B.

SITE ACTIVITIES

Region V FIT personnel conducted the sampling on April 12, 1987. Samples were split with Chemetco and also representatives hired by Chemetco.

Region V FIT personnel involved in sampling were:

- | | |
|------------------|---------------------|
| 1. Tim Boos | Team Leader |
| 2. Craig Almanza | Team Member |
| 3. Phil Smith | Team Member |
| 4. Tim Maley | Site Safety Officer |
| 5. Kelly Walker | Sampler |
| 6. Dirk Kaiser | Team Member |

A slag sample (SAS2882E05) was taken from a randomly picked bag of slag housed in a shed near the plant entrance. The shed houses slag samples generated by a statistically based program that Chemetco and the University of Illinois, Edwardsville performed in January 1985. Slag is a by-product of the smelting step.

Sample locations are displayed in Figure 2. Listed below is a summary of sample types.

<u>Sample</u>	<u>Sample Number</u>	<u>Type</u>	<u>Analysis Conducted</u>
Sediment-polish pit	SAS2882E01	grab	2,3,7,8-TCDD and other dioxin and furan isomers.
Sediment-recirculation canal	SAS2882E02	grab	"
Sediment-staging area	SAS2882E03	composite	"
Sludge-sludge bunker	SAS2882E04	composite	"
Slag-7n02	SAS2882E05	composite	"

RESULTS

Results of the analyses indicate no 2378-TCDD present, but a number of dioxin isomers are present in four of the samples. Table 1 summarizes the results.

The 2378-TCDD toxic equivalence of these isomers was computed for samples SAS2882E01 through SAS2882E04 (SAS2882E05 showed negligible isomers) (Table 2 provides results). Results indicate the highest equivalence rating is 2.4 ppb for SAS2882E01 (provided below).

Sample Number	2,3,7,8-TCDD ppb*	2,3,7,8-TCDD equivalent (ppb)
SAS2882E01	ND**	2.4152
SAS2882E02	ND	0.2532
SAS2882E03	ND	0.1150
SAS2882E04	ND	0.6134
SAS2882E05	ND	0.00

* Samples are reported on a dry weight basis.

** ND - Not detected.

SUMMARY

Sample results show dioxin isomers on-site at the polish pit, old recirculation canal, staging area, and the sludge bunker. The highest levels were at the polish pit, where 2378-TCDD toxic equivalence is 2.4 ppb. All others are less than 1.0 ppb.

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TABLE 1
4/12/87 SAMPLING RESULTS IN PARS PER BILLION

	<u>SAS29A2E01</u>	<u>SAS29A2E02</u>	<u>SAS29A2E03</u>	<u>SAS29A2E04</u>	<u>SAS29A2E05</u>
2378-TOTX	ND	ND	ND	ND	ND
Total TCE	15.129	0.432	0.277	1.450	5
12378-PCDF	0.382	0.034	0.034	0.094	5
Total PCDF	12.905	0.987	0.415	1.050	5
123478-HxCDD	0.511	0.063	0.029	0.125	5
123678-HxCDD	1.173	0.152	0.091	0.290	5
123789-HxCDD	1.812	0.226	0.140	0.396	5
Total HxCDD	14.645	1.993	0.988	1.362	5
1234678-HpCDD	10.743	1.478	1.080	2.211	5
Total HpCDD	21.955	3.269	2.071	5.497	5
OCDD	20.527	5.053	4.291	9.242	0.028
2378-TCDF	15.972	1.995	0.649	4.396	5
Total TCDF	71.167	8.474	1.111	20.190	5
12378-PCDF	2.101	0.259	0.091	0.161	5
23478-PCDF	6.193	0.692	0.250	1.560	5
Total PCDF	40.197	5.049	2.184	11.672	5
123478-HxCDF	10.676	1.426	0.607	2.699	5
123678-HxCDF	3.744	0.538	0.211	0.920	5
234678-HxCDF	8.475	1.171	0.468	2.113	5
123789-HxCDF	0.675	0.083	ND	0.151	ND
Total HxCDF	44.344	6.317	2.560	11.507	ND
1234678-HpCDF	30.401	4.328	1.991	7.267	0.022
1234789-HpCDF	9.209	1.077	0.349	1.136	ND
Total HpCDF	46.975	8.476	1.411	14.345	0.024
OCDF	44.218	0.512	1.281	17.143	0.050
2378TCDD	2.42	0.25	0.12	0.41	5*
equivalents (rounded)					
2378TCDD	2.4192	0.2532	0.1150	0.4134	5
equivalents					

* ND = Toxic equivalence computation not performed.

TABLE 2
DIOXIN ISOMERS AND 2378-TCDD EQUIVALENTS (ppb)

	<u>SAS2082E01</u>	<u>SAS2082E02</u>	<u>SAS2082E03</u>	<u>SAS2082E04</u>	<u>SAS2082E05</u>
2378-TCDD	0.0	0.0	0.0	0.0	0.0
Other TCDD	3.1	0.6	0.3	1.6	0.0
2378-TCDF	14.0	2.0	0.7	4.4	0.0
Other TCDF	55.1	6.9	3.2	14.4	0.0
2378-PCDD	0.4	0.0	0.0	0.1	0.0
Other PCDD	12.5	1.0	0.4	1.9	0.0
2378-PCDF	2.1	0.2	0.1	0.5	0.0
Other PCDF	46.1	4.0	2.1	11.0	0.0
2378-HxCDD	1.0	0.2	0.1	0.4	0.0
Other HxCDD	14.4	1.8	0.9	3.0	0.0
2378-HxCDF	0.7	0.1	0.0	0.2	0.0
Other HxCDF	47.6	6.2	2.6	11.3	0.0
2378-HpCDD	0.0	0.0	0.0	0.0	0.0
Other HpCDD	21.0	3.3	2.1	5.5	0.0
2378-HpCDF	0.0	0.0	0.0	0.0	0.0
Other HpCDF	99.0	8.4	3.4	14.4	0.0
OCDD	20.5	5.0	4.3	9.3	0.0
OCDF	64.7	9.5	3.3	17.2	0.0
Sum of 2378-TCDD Equivalents	2.4152	0.2532	0.1156	0.6134	0.0

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APPENDIX A

Soil Sample Collection Procedures:

1. Prior to sampling, check to see that the equipment is clean. If it appears dusty or dirty, it is from insufficient cleaning, handling, or packaging. If this is the case, another place should be used.
2. Before sampling, the grass should be trimmed to just above the soil surface in the areas to be cored.
3. Soil samples will be collected by forcing a bulb planter into the soil to an approximate depth of four (4) inches. Three to five cores may be needed to obtain a sufficient quantity of soil, enough to fill a 1-quart wide mouth glass container half full. This will constitute one grab sample.
4. When the core is extracted, it will be placed in a clean disposable aluminum foil pan. The cores will be mixed with a clean stainless steel spoon and knife. The stones, roots, twigs, grass, and other foreign debris will be discarded with clean stainless steel tweezers or strawberry hullers.
5. Once the grab sample is collected and all debris removed, place the sample into the glass 1-quart wide mouth container that was cleaned and supplied by Versar. After each grab sample is collected, the disposable aluminum pan, bulb planter, tweezers and spoon should be discarded, and new decontaminated equipment used for the next grab sample.
6. Sediments will be obtained from selected sites in sufficient volume to fill the sampling containers. Samples will be collected with stainless steel spoons and initially placed in a clean, disposable aluminum foil pan. Free water will be decanted from the grab sample of sediments prior to

introduction to the sample containers. After each grab sample is collected, the aluminum foil pan and stainless steel spoon should be discarded, and new decontaminated equipment used for the next grab sample.

7. Fill out all necessary field data forms for the sample and attach identifying labels to the sample jars. Initiate a chain-of-custody record for the sample. Pack the samples for shipment including the required field blanks and performance evaluation samples.
8. Prepare site documents. Since it may be necessary to revisit the site in the future to resample, sample activities must be thoroughly documented. At a minimum, a map should be drawn showing approximate sample locations with distances to two or three permanent features (ex. corner of a building, trees, light poles, etc.). A site photograph is required to document the location.
9. Prepare site map. On a 8 1/2 x 11 inch sheet of paper, draw a map of the sampling site showing its general location (include street names), and the positions of any permanent features such as roads, telephone poles, large trees, etc. Also, note anything which might help to make the site easier to locate for any follow up sampling. Each map should contain the following information: city, county, and/or state names, date of sampling, facility, address, name of site, north arrow, and scale, if applicable.
10. Photograph the sampling site. Place the site number on a large card within the area to be photographed and take a color photograph of the site. Indicate the direction of the photo on the sketched site map. If it can be accomplished

easily, try to include identifying landmarks, such as houses, telephone poles, etc., in the photograph. When the pictures or slides have been developed, write the name of the city, county and state, the site number, and the sampling date on the back of the photos or on the front of the slides.

APPENDIX B

Sampling Equipment:

Versar will supply the sample jars. A field blank and a performance evaluation sample will also be submitted for analyses.

There should be very little variation in equipment used in obtaining soil samples. After the sampling locations are chosen, the sample will be collected with a clean bulb planter and placed in the sample jars. To avoid cross contamination among sampling locations, the bulb planter, spoon, knife, twizzer, and the aluminum foil pan will be properly discarded in a 55 gallon drum after sampling at each location. Sampling personnel should inspect all equipment before it is used to ensure it is clean.

A. Cleaning of Sampling Equipment

Each piece of sampling equipment will be cleaned prior to the collection of the samples. This should take place in a relatively clean location, not in field locations.

1. A stainless steel wash basin will be used. 1 1/2 tablespoons of Alconox detergent solution will be added per gallon of hot tap water. Scrub sample equipment with a wooden handled bristle brush.
2. Rinse equipment with tap water.
3. Final rinse with distilled water.
4. Air dry equipment. Wrap equipment with aluminum foil - dull side out.